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Favourable conservation status of European important species of genus *Vertigo* spp. in Slovakia – categories and criteria

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A b s t r a c t : Categories and criteria for the definition of favourable conservation status for mollusc species of Community Interest in Slovakia have been proposed and published. The paper is focusing on species of genus *Vertigo* spp. listed in the Habitats Directive and with occurrence in Slovakia – *Vertigo angustior* JEFFREYS 1830, *Vertigo geyeri* LINDHOLM 1925 and *Vertigo moulinsiana* (DUPUY 1849). The species are listed in the national red list of molluscs of Slovakia as endangered (*V. geyeri*, *V. moulinsiana*) or vulnerable (*V. angustior*). In accordance with the categories and criterion for definition of favourable status the following preliminary status of the species were defined: "good favourable" for *V. angustior* and "average favourable" for both *V. geyeri* and *V. moulinsiana*.

K e y w o r d s : favourable conservation status, categories and criterion, *Vertigo* spp., Mollusca, Slovakia.

Introduction

In May 2004 Slovakia officially became a member of the European Union (EU). It means not only benefits, but also a lot of obligations regarding EU legislation. From the nature conservation point of view two directives concerning the network of protected sites of the European importance (Natura 2000) – Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive) and Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) are most important for the time being. One of the key terms in the Habitats Directive is "Favourable Conservation Status" of the species and habitats of Community Interest.

The Slovak Republic is one of the first countries, which have already started the process of preparation of a proposal of categories and criterion for definition of favourable conservation status as well as monitoring guidelines for each species, or groups of species separately. A lot of specialists from scientific institutes, universities, NGO's, e.g. Slovak Academy of Science, Universities in Bratislava, Zvolen, Banská Bystrica, Prešov, Group for Bat Protection (SON), Slovak Ornithological Society/BirdLife Slovakia (SOS/BirdLife Slovakia), Raptor Protection of Slovakia (RPS), etc. were involved in the preparatory process. Four working groups were established – separately for non-forest biotopes, forest biotopes, plant species and animal species.

Working group for animal species was co-ordinated by the Centre of State Nature Conservancy of the Slovak Republic in Banská Bystrica, which is a governmental institution

focusing on nature and landscape conservation and is directly coming under the Ministry of Environment of the Slovak Republic. The preparatory process took more than 1 year of intensive work. Proposals of the categories and criterion for all the animal species listed in the Annex II (Animal and Plant Species of Community Interest, whose conservation requires the Designation of Special Areas of Conservation), as well as in the Annex IV (Animal and Plant Species of Community Interest in Need of Strict Protection) and in the Annex V (Animal and Plant Species of Community Interest whose taking in the wild and exploitation may be subject to management measures) of the Habitats Directive were prepared and published (POLÁK & SAXA 2005) and also are available on www.sopsr.sk/natura2000.

Results

In Slovakia 7 mollusc species listed in the Annex II or Annex IV of the Habitats Directive are occurring: *Anisus vorticulus* (TROSCHER 1834), *Sadleriana pannonica* (FRAUENFELD 1865), *Theodoxus danubialis* (C. PFEIFFER 1828), *Unio crassus* PHILIPSSON 1788, *Vertigo angustior* JEFFREYS 1830, *V. geyeri* LINDHOLM 1925 and *V. moulinsiana* (DUPUY 1849). In the Annex V of the Habitats Directive widespread species in Slovakia *Helix pomatia* LINNAEUS 1758 was included. Because the species has been over-collected from the fields for a long time, regulation measures were established in order to protect the species in selected regions of Slovakia.

In the following part of this contribution we are focusing on European important mollusc species of genus *Vertigo* spp. within Slovakia.

In accordance with "German model" of categories and criterion for definition of favourable conservation status, **3 status** of species were defined: good, average and unfavourable. At the same time the "good" and "average" status should be considered as **favourable conservation status**. Hereafter the species should be evaluated according to the criterion for definition of favourable conservation status (C), which were divided into the following three main groups (see table 1):

- population (C1)
- habitat (C2)
- threats (C3)

C1: Population

From the population-ecology point of view the population size and abundance are the most important characteristics. The population size means the up-to-date number of individuals of the locality. The number of individuals does not provide enough information particularly about the population status in the concrete time and on the concrete locality. Generally monitoring in the number of population is one of the essential factors concerning the objective definition of favourable conservation status.

The defined population size of the *Vertigo* spp. species (it means number of exemplars/square meter on the locality) was based on current information about the species distribution and status in Slovakia. However, more intensive field research is needed in the future, particularly focusing on molluscs' communities of wetland habitats. *V. geyeri* and *V. moulinsiana* are the species with relict occurrence in Slovakia. *V. angustior* is

relatively widespread in Slovakia, so the limits of population size of the species on the locality for definition of favourable conservation status could be discussed and modified in the future.

Seasonal changes of numbers of individuals (population dynamics) have to be taken into account regarding the definition and evaluation of favourable conservation status of the species. Thus, a slow decrease of numbers of individuals should be regarded as "favourable status". Otherwise, long-term and strong decrease of numbers of individuals is the signal that appropriate management measures are necessary.

C2: Habitat

The species are occurring especially on calcareous wetlands such as fens, marshlands, swamps, grasslands, tuffa springs, etc. *V. moulinsiana* prefers localities with *Carex paniculata*, *C. elata*, *Phragmites australis*, *Typha latifolia*, *Typha angustifolia* as well as lakes and fishpond margins. Population of the species is under the strong influence of the habitat structure and status. Open habitats with well-preserved stands of low vegetation without or only low level of eutrophication are the most appropriate habitats concerning the species in Slovakia. Habitats, more or less influenced by a succession of vegetation and, with low level of overgrowing and overshadowing, can be considered as favourable, as well. According to the habitat requirements and ecology of the species, intensively utilised grasslands, agricultural lands and strongly overshadowed habitats, should be considered as unfavourable.

Water regime is one of the most important factors determining the suitability of the habitats for the species. The favourable status of the wetland mollusc species strongly depends on humidity and water level (both above- and underground). The water regime on the locality has to be monitored during the summer because of the seasonal fluctuations. Complete drainage of the locality causes both destruction of the locality and the population of wetland species.

V. angustior occurs relatively often together with *V. geyeri* or *V. moulinsiana*. The species have similar requirements concerning habitats, both from the structure of the habitat or water regime point of view. Thus, one proposal of categories and criterion of favourable conservation status was prepared for all the species together. The proposal was based on the contribution of KILLEEN (2003) regarding ecology of *V. moulinsiana*.

C3: Threats

Threats of the habitats and intensity of negative factors play a significant role concerning the definition of favourable conservation status of species. No negative factors causing the changes of habitat changes or only natural variation observed on the locality can be considered as favourable status. More intensive overshadowing is the first warning signal of negative changes on the locality and even non-professional observers should be able to recognize it. Eutrophication and the soil acidity have to be monitored in order to objective definition of favourable conservation status as well. Stepwise destruction of the habitats in consequences of agricultural utilisation, particularly drainage, and significant overshadowing are the most negative factors. However, we should realize appropriate management measures in order to avoid them and to achieve favourable conservation status of the species and habitats.

Table 1: Categories and criterion for definition of favourable conservation status of the European important *Vertigo* spp. species in Slovakia.

Criterion		FAVOURABLE STATUS		UNFAVOURABLE STATUS
		A	B	
		Good	Average	Unfavourable
Population	Population size* on the locality	> 25 living ind./m ²	< 5 living ind./m ² or registered presence of recent empty shells	No living individuals or only sporadic subrecent empty shells
	Population abundance** on the locality	Regular significant to slight increase	Stable population abundance or slight decrease	Significant long-term decrease
Habitats	Status	Open habitats with well-preserved stands of low vegetation without or only low level of eutrophication	Overgrowing and overshadowing of the habitats; eutrophication	Intensively utilised grasslands; agricultural land; strongly overshadowed habitats
	Water regime on the locality (evaluation has to be done in summer)	High water level (in part of the locality the water level is above the ground) or small decrease of the water level (max. 0,3 m under the ground)	Significant decrease of the water level (over 0,3 m under the ground)	Complete drainage of the locality
Threats	of the habitat	No or natural degradation of the habitats that leads to a change of habitat structure and type of vegetation and in consequence a decrease of the species abundance	Significant change of the habitat structure and type of vegetation in a consequence of human activities; strong eutrophication; increase of the soil acidity	Stepwise liquidation of the habitat in a consequence of agricultural utilisation (particularly drainage); significant overshadowing of the habitat

Notes:

* It is evaluated the presence and abundance of living specimens, recent or subrecent shells, respectively.

** It is necessary to take into account the level of information on abundance dynamics (oscillation) of the species population on the locality.

Preliminary definition of favourable conservation status of the *Vertigo* spp. species within Slovakia

All the European important species of genus *Vertigo* spp. were evaluated separately under the categories and criterion for definition of favourable conservation status with aim to test their suitability and applicability within Slovakia. There were 1, 2 or 3 points assigned to each of the criterion: 1 – unfavourable status, 2 – average status, 3 – good status, as well as each of the criterion was considered according to its importance: 0 – no importance, 1 – less importance, 2 – average importance, 3 – highest importance. The total sum was achieved as a sum of a multiple of the "status" (A, B or C) and the weight. The status of the species was classified in accordance with a percentage share of the possible maximum of the total sum (table 2). The possible maximum of the total sum means a multiple of the favourable status (A) and the weight.

Table 2: Percentage share of points for definition of favourable conservation status of the European important *Vertigo* spp. species in Slovakia.

A – Good (%)	B – Average (%)	C – Unfavourable (%)
100-78	77-55	54-33

Vertigo angustior JEFFREYS 1830 (Tab. 3)

Currently there is a lack of information about the population size and abundance of this species in Slovakia. Despite the fact, the criterion C1 was evaluated as "good" because of the relatively widespread distribution of the species in Slovakia. Even though a low weight (2 or 1) was appointed for the criterion C1. The criterion C2 (Habitats) was evaluated as "good" from the habitat status point of view and "average" concerning the water regime because of the long-term decreasing of numbers of suitable wetland habitats within Slovakia, generally.

V. angustior is listed as vulnerable (VU) in the National Red List of Molluscs of Slovakia (ŠTEFFEK & VAVROVÁ 2006), which was prepared in 2006 under the categories and criterion of IUCN, version 3.1 (2001).

Conclusion: *V. angustior* has "good favourable conservation status" in Slovakia.

Table 3: *Vertigo angustior* JEFFREYS – the species status final evaluation within Slovakia.

Criterion		A	B	C	Weight (0-3)	Reached value (status x weight)	Possible maximum value (weight x A)
Population	Size	3	2	1	2	6	6
	Abundance	3	2	1	1	3	3
Habitats	Status	3	2	1	3	9	9
	Water regime	3	2	1	3	6	9
Threats	of the habitat	3	2	1	3	6	9
Total						30	33
Result (%):						91	

***Vertigo geyeri* LINDHOLM 1925 (Tab. 4)**

V. geyeri is a relict species in Slovakia with occurrence particularly in the northern part of Europe. In Slovakia the localities of the species are situated mainly in the foothills of Tatra Mts and in the Orava and Liptov regions. The species is listed as endangered (EN) in the national red list (ŠTEFFEK & VAVROVÁ 2006).

Because of the relict occurrence of the species in Slovakia, the population was evaluated as "average" from the population size point of view and "unfavourable" regarding the population abundance. The species is more sensitive concerning the habitats in comparison with the other species. Thus, the habitats (both the status and water regime) and its threats are "average" from favourable conservation status point of view.

Conclusion: *V. geyeri* has "average favourable conservation status" in Slovakia.

Table 4: *Vertigo geyeri* LINDHOLM – the species status final evaluation within Slovakia

Criterion		A	B	C	Weight (0-3)	Reached value (status x weight)	Possible maximum value (weight x A)
Population	Size	3	2	1	2	4	6
	Abundance	3	2	1	1	1	3
Habitats	Status	3	2	1	3	6	9
	Water regime	3	2	1	3	6	9
Threats	of the habitat	3	2	1	3	6	9
Total:						23	33
Result (%):						70	

***Vertigo moulinsiana* (DUPUY 1849) (Tab. 5)**

V. moulinsiana is the species with a relict occurrence in Slovakia as well as *V. geyeri* mentioned above. Isolated localities particularly in southern and eastern Slovakia are the main distribution areas of the species in Slovakia, as well as suitable localities in Biele Karpaty Mts, Malé Karpaty Mts and Považský Inovec Mts. The species is endangered in Slovakia (ŠTEFFEK & VAVROVÁ 2006) according to categories and criterion of IUCN, version 3.1 (2001).

At present there is a lack of data concerning the species population size and abundance in Slovakia. Despite the low abundance, the population is more or less stable at the localities, which have been irregularly monitored for more than 2 years. The criterion C1 (Population) was evaluated as "average". The habitat status was evaluated as "average" because of the step by step increasing eutrophication. The water regime at the localities is suitable at present, without significant negative changes – it means "good" from the species requirements point of view regarding the habitat quality. There is a long-term negative trend in human activities causing fragmentation of the distribution area of the species and liquidation of its habitats in Slovakia as well. Thus, the criterion C3 (Threats

of habitats) was evaluated as "average" concerning favourable conservation status of the species (see table 5).

Conclusion: *V. moulinsiana* has "average favourable conservation status" in Slovakia.

Table 5: *Vertigo moulinsiana* (DUPUY) – the species status final evaluation within Slovakia.

Criterion		A	B	C	Weight (0-3)	Reached value (status x weight)	Possible maximum value (weight x A)
Population	Size	3	2	1	1	2	3
	Abundance	3	2	1	1	2	3
Habitats	Status	3	2	1	3	6	9
	Water regime	3	2	1	3	9	9
Threats	of the habitat	3	2	1	3	6	9
Total						25	33
Result (%):						76	

Conclusion

The proposal of the categories and criterion for definition of favourable conservation status of the species of Community Interest in Slovakia was prepared according to the Birds Directive and the Habitats Directive of the European Union. The contribution is focusing on the European important species of genus *Vertigo* spp. in Slovakia (*V. angustior*, *V. geyeri* and *V. moulinsiana*) listed in the Annex II of the Habitats Directive. In accordance with up-to-date information concerning the species, the following status were defined for the species: *V. angustior* – **good favourable status**, *V. geyeri* – **average favourable status** and *V. moulinsiana* – **average favourable status**. Generally all the species have a favourable status. However, degradation and liquidation of suitable habitats have been continuing for a long time as results of overshadowing and changes in vegetation type (due to natural processes and human activities as well), intensive mowing, significant changes in a water regime (especially due to drainage) as well as

strong eutrophication. In order to avoid the negative effects and to achieve and maintain favourable conservation status of the species the following management measures are proposed:

- Elimination of activities causing the significant changes in water regime and hydrological conditions.
- Elimination of pasturing and intensive mowing causing decrease of preferred plant species.
- Elimination of invasive wood species and allochthonous plant species to avoid overgrowing of the locality.
- Elimination of using of pesticides and herbicides.

The presented categories and criterion for definition of favourable conservation status of the species should be considered as a first proposal. An application of the categories and criterion in the field is needed in order to test their suitability concerning the species and its status in Slovakia. A more intensive field research and monitoring of molluscs of wetland habitats focusing particularly on distribution and population size and abundance in Slovakia is necessary concerning all the species mentioned above.

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